Volunteer Lake Assessment Program Individual Lake Reports

HIGHLAND LAKE, ANDOVER, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	3,264	**Max. Depth (m):**	13.4	**Flushing Rate (yr^{1})**	1.5
Surface Area (Ac.):	211	**Mean Depth (m):**	5	**P Retention Coef:**	0.59
Shore Length (m):	4,700	**Volume (m^{3}):**	4,278,500	**Elevation (ft):**	645

TROPHIC CLASSIFICATION

Year	Trophic class
1978	MESOTROPHIC
1994	MESOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

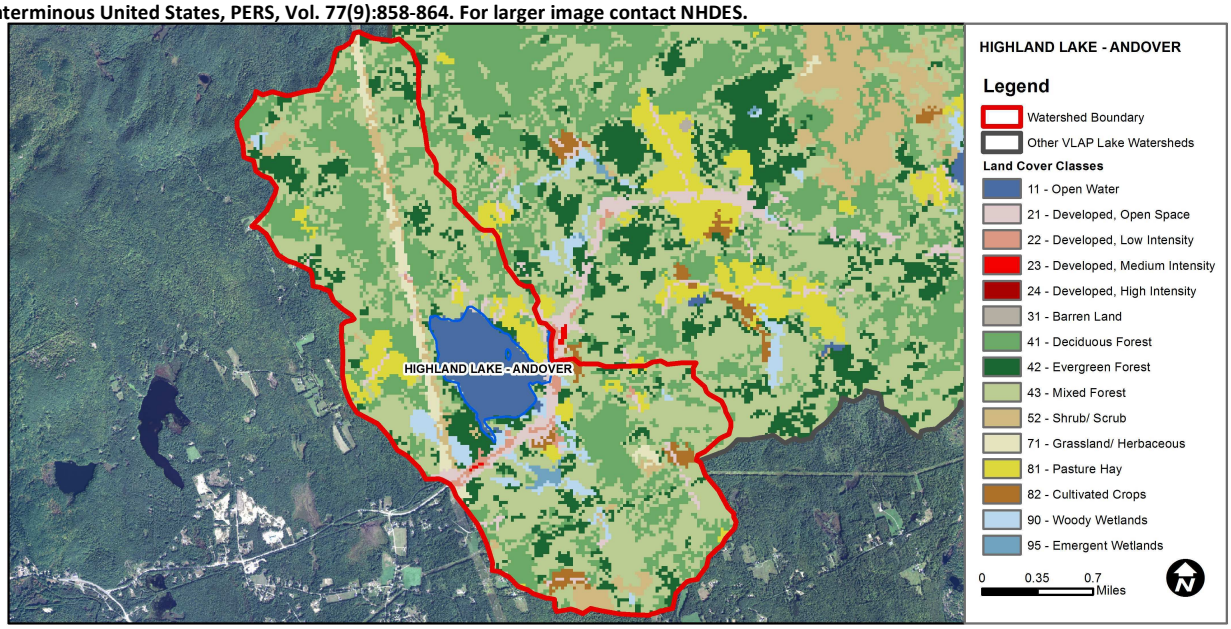
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	>/=5 samples and median is < threshold but > 1/2 threshold value.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	D.O. (mg/L)	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	D.O. (% sat)	Encouraging	< 10 samples and no exceedance of criteria. More data needed.
	Chlorophyll-a	Good	>/=5 samples and median is < threshold but > 1/2 threshold value.
Primary Contact Recreation	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.
	Chlorophyll-a	Very Good	At least 10 samples with 0 exceedances of criteria.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

HIGHLAND LAKE - TOWN BEACH	E. coli	Very Good	All bacteria samples <75% of geometric mean criteria, but not enough to calculate geometric mean. Or, all bacteria samples are < single sample criteria and calculated Geometric means are less than geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	6.48	Barren Land	0	Grassland/Herbaceous	2.66
Developed-Open Space	2.72	Deciduous Forest	25.65	Pasture Hay	4.23
Developed-Low Intensity	0.84	Evergreen Forest	9.65	Cultivated Crops	1.04
Developed-Medium Intensity	0.03	Mixed Forest	40.23	Woody Wetlands	2.57
Developed-High Intensity	0	Shrub-Scrub	3.56	Emergent Wetlands	0.4

VOLUNTEER LAKE ASSESSMENT PROGRAM INDIVIDUAL LAKE REPORTS
HIGHLAND LAKE, ANDOVER, NH
2013 DATA SUMMARY

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **CHLOROPHYLL-A:** Chlorophyll levels were low on each sampling event and much less than the state median. Historical trend analysis indicates stable chlorophyll with low variability between years.
- **CONDUCTIVITY/CHLORIDE:** Deep spot and tributary conductivity and chloride levels were low and approximately equal to the state median. Historical trend analysis indicates stable epilimnetic conductivity with low variability between years.
- **TOTAL PHOSPHORUS:** Epilimnetic phosphorus was slightly elevated in May potentially due to significant storm event prior to sampling, however average epilimnetic phosphorus was low and less than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Metalimnetic phosphorus was slightly elevated in August and turbidity was also slightly elevated indicating a layer of algae at this depth. Hypolimnetic phosphorus was relatively stable and low on each sampling event. Outlet and Tilton Brook phosphorus levels were relatively low. Lower Maple St. Brook and West Inlet phosphorus levels were elevated in August.
- **TRANSPARENCY:** Transparency was good, better than the state median, and stable throughout the summer. Historical trend analysis indicates relatively stable transparency with moderate variability between years.
- **TURBIDITY:** Epilimnetic, Lower Maple St. Brook and Tilton Brook turbidities were low. Metalimnetic turbidity was slightly elevated in August due to a layer of algae. Hypolimnetic turbidity was elevated in July and August. Outlet turbidity was slightly elevated in May, June and August, and West Inlet turbidity was slightly elevated in August.
- **PH:** Metalimnetic and hypolimnetic pH levels were generally less than the desirable range 6.5 – 8.0 units. Historical trend analysis indicates relatively stable epilimnetic pH with moderate variability between years.
- **RECOMMENDED ACTIONS:** Phosphorus and turbidity levels generally remained low following significant storm events prior to sampling which is a positive sign. However, the increased frequency and intensity of storm events highlights the importance of managing stormwater runoff in the watershed where necessary. Overall water quality looks good; keep up the great work!

Table 1. 2013 Average Water Quality Data for HIGHLAND LAKE

Station	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	Total P ug/l	Trans. m NVS	Trans. m VS	Turb. ntu	pH
Epilimnion	6.43	2.62	3	34.7	8	4.72	5.00	0.63	6.86
Metalimnion				35.6	10			1.04	6.35
Hypolimnion				38.7	12			6.11	6.15
Lower Maple St Brook				27.9	13			0.38	6.74
Outlet				37.9	11			1.09	6.75
Tilton Brook				22.7	8			0.67	6.66
West Inlet			4	41.8	16			0.95	6.31

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: < 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: 6.5-8.0 (unless naturally occurring)

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
pH	Stable	Trend not significant; data moderately variable.	Chlorophyll-a	Stable	Trend not significant; data show low variability.
Conductivity	Stable	Trend not significant; data show low variability.	Transparency	Stable	Trend not significant; data moderately variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.